Environmental fiscal reform and willingness to pay for the environment: an empirical analysis on European micro data

Salvatore Ercolano and Giuseppe Lucio Gaeta and Oriana Romano

University of Naples "L'Orientale"

26. June 2012

Environmental fiscal reform and willingness to pay for the environment: an empirical analysis on European micro data

Salvatore Ercolano
sercolano@unior.it

Giuseppe Lucio Gaeta
glgaeta@unior.it

Oriana Romano
oromano@unior.it

Department of Humanities and Social Sciences
University of Naples "L'Orientale"

Abstract
This paper empirically investigates the determinants of willingness to pay (WTP) for the environment, employing micro data from the European Value Survey (EVS) over 2008-2010 in 27 European countries. Using ordered logit, logit and partially constrained generalized ordered logit models, we explore a wide set of individual and country level determinants. Our particular focus is on whether WTP is influenced by the Environmental Fiscal Reforms (EFR), carried out only in some countries of our sample. Our results show that WTP for the environment is lower in countries where an Environmental Fiscal Reform has been introduced. Moreover, analyses conducted on the role of information highlight that being presumably aware of the environmental fiscal reform does not affect positively the marginal willingness to pay for the environment.

JEL codes: R220, Z130, H23
Keywords: Willingness to pay, environment, environmental fiscal reform

1.Introduction

Several studies empirically investigated the factors affecting the willingness to pay (WTP) for the environment. While this approach has several limitation (i.e. there may exist a remarkable gap between the declared WTP and actual behaviour), it shows that beyond individual socio economic characteristics, personal beliefs and political orientation, as well as features of the context of residence play a significant role in influencing attitudes revealed by the citizens.
More in detail, analyses have been conducted focusing on regional differences (Torgler and Garcia-Valiñas, 2007; Witzke and Urfei, 2001) or showing comparison between high income and

low income countries (Dorsch 2011; Franzen and Meyer 2010; Duroy 2005; Israel and Levinson 2004; Inglehart 1995).

This paper contributes to this literature by carrying out a European level analysis, focusing on the role of governments' fiscal policies in influencing individual WTP for the environment. In particular, we empirically analyze preferences expressed by the citizens of 27 European countries and verify if they can be possibly affected by the existence of fiscal arrangements set out by a national explicit Environmental Fiscal Reform (EFR).

The EFR consists in a number of integrated interventions (i.e. taxes, subsidies, incentives) carried out in some European countries in order to discourage polluting activities and achieve, jointly, economic and employment objectives. A central point of the reform is represented by the "tax shift" from distortive taxes to environmental ones, generating the so called "double dividend".

Empirical studies have taken into account the effects of EFR on competitiveness (Enevoldesen et al. 2009; Barker et al. 2007, 2009), on equity (Barker and Kohler, 1998) and have studied its social acceptance (Clinch et al. 2006a, 2006b; Dresner et al. 2006), but, as far as we are currently aware, there are not studies analyzing the role of EFR in influencing WTP for the environment. Nevertheless, for its characteristics, aims and effects it seems reasonable to suppose that individuals' WTP for the environment might be affected by the existence of fiscal arrangements set out by an EFR.

In order to test it, we analyze micro data provided by the 2008-2010 wave of the European Values Survey (EVS), where people are asked about their own willingness to give part of their income in order to prevent environmental pollution. Following the main literature, we control for a wide number of individual level and country level determinants of the revealed WTP. Analyses are carried out by means of standard ordered logit model, while robustness checks include logit models and the partially constrained generalized ordered logit model.

Our results highlight a strong negative effect of EFR on individuals' WTP for the environment and show that being aware of the existence of the EFR does not impact positively on the WTP. Summarizing, the original contribution of this paper consists of two main elements: the investigation of the EFR as a determinant of WTP for the environment using European data and the employment of the partial generalized ordered logit model to better investigate if the effect of the independent variables vary by the level of the dependent variable, violating the parallel lines assumption.

The reminder of the paper is organised as follows. Section 2 presents an overview of the existing literature on the issue of individual WTP for the environment. Section 3 gives a detailed definition of EFR and illustrates its contents in the countries where it has been set out. Section 4 presents the data we use in our empirical analysis, while Section 5 illustrates the methodology we applied. Our results are shown in Sections 6 and 7, while Sections 8 and 9 are dedicated to discussion and final remarks.

2. Determinants of the individual WTP for the environment: the existing literature

A broad literature focused on the determinants that affect the willingness to pay for the environment, exploring the environmental attitude or the applicability of market based instruments for internalizing negative externalities.

Although its remarkable interest, this approach presents several limitations, related to the sociological issues that the well known literature on the contingent valuation has largely set out (i.e. there may exist a gap between the declared WTP and actual behaviour), but also to the aspects of the question itself, that being related to the marginal willingness to pay for the environment in general, may reduce the real concern for the environment (Witzke and Urfei 2001; Togler and Garcia-Valiñas 2007), as there is not the perception of a concrete and tangible problem.

The literature using survey data investigates the determinants of WTP for the environment at single country level, focusing on regional differences (Torgler and Garcia-Valiñas 2007; Witzke and Urfei, 2001) or shows comparison between high income and low income countries (Dorsch 2011; Franzen and Meyer 2010; Duroy 2005; Israel and Levinson, 2004; Inglehart 1995).

Generally the independent variables taken into consideration can be divided into: individual (i.e. socio-economic conditions, political and social values) and country variables.

Not surprisingly what affects significantly the WTP is the income variable. In a cross national analysis Franzen and Meyer (2010) find the confirmation of “prosperity assumption”, stating that environmental quality increases with income and that public environmental concern, measured by an additive index including the WTP for taxes or higher price to protect the environment, depends predominately on individual characteristics, rather than macro context. Auci et al. (2006), following the Kuznetz curve hypothesis, demonstrate that the WTP increases at higher levels of income. They explain this phenomenon as a pure income driven effect and not because of the link between income and other certain values of a country. Analyzing the specific case of low-income countries, Israel and Levinson (2004) find no strong evidence that people's WTP increases with per-capita GDP.

Gender and education also affect the WTP for environmental protection (Franzen and Meyer 2010; Torgler et al. 2008). Torgler and Garcia-Valiñas (2007) find that women are more willing to pay as they show a stronger preference towards the environment. In Pirani and Secondi (2010) this trend is confirmed: higher level of eco-friendly behavior is found among women, adult and elderly couples, and people with a high socio-economic status. Duroy (2005), among others, find that WTP for the environment and attitude in protecting the environment is a function of the level of education.

Variables related to politics are found to have strong impact on environmental attitude and WTP. This effect has been measured using several proxies, such as political interest – discussing politics, interest in politics and political orientation (Torgler and Garcia-Valiñas 2006, 2007); political affinity -numbers of voters of green parties- (Kollmann et al. 2012); political ideology and party identification (Konisky et al. 2008; Witzke and Urfei 2001). In all the cases they significantly affect the WTP for environmental protection.

The variable trust is used in order to estimate the role of social capital in affecting WTP (Torgler and Garcia-Valiñas 2007; Dorsh 2011) and in understanding attitudes about government

intervention to protect the environment (Koniski et al. 2008). Religion is included as a significant proxy for civic values (Greeley 1993), while among the individual values the sense of belonging to a certain community (global/local) is also investigated. Auci et al. (2006) find that the sense of belonging to a wider regional group, national pride and individual blame on tax evasion are strongly positively correlated with the WTP for the environment. Dorsh (2011) states that people who view themselves as world citizens have more WTP for the environment than others.

As context variables, several studies includes in their models variables related to the status of the environment (Franzen and Meyer 2010, Kollman et al. 2012). Witzke and Urfei (2001) in a regional analysis find that noise from cars and litter in the neighborhood increases individuals' WTP; Dorsh (2011) in analyzing the WTP in developing countries finds out that the perception of global warming - loss of plant/animal biodiversity, pollution of lakes and oceans, and greenhouse effect has a positive impact on individuals' MWTP, but not the local ones, expressed by poor water quality, poor air quality, poor sewage and sanitation.

Following the main literature on this subject, in our analysis we will employ a wide number of individual level and country level determinants of the revealed WTP, adding some reflections in particular on the role of EFR carried out in Europe.

3. Brief overview on the environmental fiscal reform

The Environmental Fiscal Reform (EFR)[1] encompasses a number of measures – taxes, subsidies, investments, incentives- aimed at combining the reduction of environmental degradation with political economy' objectives (EEA 2011a, 2011b).

Since the nineties an explicit EFR has been employed by Denmark, Finland, Sweden, Germany, The Netherlands and the United Kingdom (Andersen and Ekins 2009). A crucial aspect of the reform is the tax shifting from "goods" (labour or capital) to "bads" (pollution, resource depletion) (Ashiabor et al. 2005; Bosquet 2000; EEA 2011a; Ekins et al. 2011). Based on "revenue recycling" and "budget neutrality" (WMBG, 1995 in O' Riordan 1997), it consists in offsetting the introduction or the increase of environmental related taxes, by reducing distortionary taxes and generating the so called "double dividend"[2] (Andersen et al. 2011; Ceriani, Franco 2011; EEA 2011a; EEA 2011b): "the cleaner environment is the first dividend while the increase in employment or GDP is the second dividend" (Clinch et al. 2006, p. 961).

Environmental taxes are mainly set up to reduce greenhouse gases emissions and to sustainably manage resources. Taxes on energy, CO2 direct taxes and transport taxes, related to the ownership and use of vehicles are some examples, as well as taxes on NOx and SO2 and on the

[1] Environmental fiscal reform, ecological tax reform, green tax reform, green tax swap, green tax shifting, environmental tax reform are used as synonymous by a large part of the literature (Bosquet 2000). However as in Clinch at al. (2006b) is stated, a distinction between environmental tax reform and environmental fiscal reform is made, meaning by the former, the reform implemented using exclusively environmental related taxes, without other measures.

[2] The double dividend hypothesis has always been highly debated (Carraro et al. 1996, Pezzey and Park 1998, Bosello et al. 2001).

management of water (taxes on ground water) and waste (landfill tax) (Eurostat 2010)[3], (fig.1). The difference between simple environmental taxes and environmental taxes as part of a fiscal reform is the revenue recycling system. Revenues can be allocated in advance to finance specific environmental programmes (e.g., environmental funds, environmental projects, R&D activities) or can be used to compensate some of those most affected by the tax (Dresner et al. 2006). However the nature of the so called "tax shift" is conditioned by the main aim of the reform, which can differ from country to country. Examples are: the reduction of personal income taxes in Sweden; the reduction of the general tax revenues in Finland; the improvement of environmental protection and the achievement of employment' objectives in Germany (Speck et al. 2011, in Ekins and Speck 2011). In practice then, depending on the aim of the reform, the shift will take place between environmental taxes and Personal Income tax (PIT), Social security contribution (SSC) or corporation taxes (tab. 1).

At European level three main instruments have fostered the use of market-based tools: the EU Emission Trading Scheme, the energy taxation directive (Directive 2003/96/EC) and the Eurovignette directive (Directive 1999/62/EC, revised by the Directive 2006/38/EC) (Eurostat 2010). So far, all the European Union Member States have introduced environmental taxes, but not full ETR strategies[4] (Bassi et al. 2009), with the exception of Estonia (2005) and Czech republic (2008), that recently have implemented the shift from conventional taxes on labour to environmental ones (Speeck et al. 2011, in Ekins and Speck 2011).

The effects of the EFR have been analyzed from different points of view. Discretionary analysis between EFR and non EFR regions has been conducted in order to verify the effects on competitiveness (Enevoldesen et al. 2009; Barker et al. 2007, 2009), while the households' perspective has been mainly analyzed considering the distributional effects of environmental taxes and related measures[5] (Barker and Kohler 1998; Speck 1999; Klok et al. 2006; Leicester 2006; Ekins et al. 2011). For its characteristics, aims and effects, then, it seems reasonable to suppose that EFR might affect the individual' preferences in terms of willingness to pay for the environment but, as

[3] In 2007, in most European countries for which data were available, households were the sector paying the most of total energy and transport taxes (Eurostat 2010).

[4] The implementation of the reform depends on several factors, such as macroeconomic and labour market conditions (Clinch et al. 2006a). Despite "experience shows that ETR is a potential policy tool for all EU" (Speck et al. 2011, in Ekins and Speck 2011) and studies highlight the positive impacts on economic growth and innovation and on reduction of emissions (Baranzini et al. 2000, EEA 2011a), there are several difficulties of its implementation, related mainly to social and political conditions and the design of a proper revenue recycling system (Ashiabor et al 2005), as well as complementary measures for acceptance and equity (Clinch et al., 2006a, 2006b).

[5] "The distributional effects that need to be considered in relation to ETR have various facets: 1) those due to the environmental taxes themselves; 2) those due to any tax reductions or revenue distribution associated with the ETR; 3) those that arise from the broader, economic and environmental impacts of ETR, including price changes of goods and services and macroeconomic effects such as impacts on employment levels; 4) those due to exemptions and other specific provisions that may have been made in the tax design for various purposes (e.g. competitiveness, social concerns or environmental considerations); 5) the distribution of the environmental improvements brought about by the ETR"(Ekins. et al. 2011, p.2473).

According g to EEA (2011a) the main outcomes on income distribution of environmental taxes are:

-Motor fuel taxes tend to put the highest relative burden on middle-income groups;

-Energy and carbon taxes tend to be weakly regressive in some countries and more strongly regressive in others (notably the United Kingdom);

-Rural households tend to be disproportionately burdened by environment-related taxes, especially motor fuel taxes.

far as we are aware, no previous studies have analyzed the role of EFR in influencing WTP for the environment. By means of the orderd logit model we will try to test what the role of EFR on WTP for the environment is. In particular our hypothesis is, based on the assumption that in countries in which an explicit EFR has been implemented for years, the marginal WTP for the environment might be lower than in countries where this system has not been introduced.

4. Data and descriptive analysis

Our empirical analysis is based on individual data drawn from the 2008-2010 wave of the European Value Survey database (EVS 2011). EVS represents "the most comprehensive research project on human values in Europe"[6]. It is based on interviews to representative samples of population in the European countries and collects data about the socioeconomic characteristics of the interviewees together with information about their personal beliefs, cultural tendencies and ideas about political, religious, and economic issues.

We selected data from 27 European countries: Austria, Belgium, Bulgaria, Cyprus, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Ireland, Italy, Latvia, Lithuania, Luxemburg, Malta, Netherlands, Poland, Portugal, Romania, Slovak Republic, Slovenia, Spain, Sweden, United Kingdom, the latter being formed by the data collected England plus the ones from Northern Ireland. As already discussed in section 3, six among them carried out an explicit EFR before 2008 (Denmark, Finland, Germany, Netherlands, Sweden, UK).

We measure the individual WTP for the environment through the answer given to the question: *"I would give part of my income if I were certain that the money would be used to prevent environmental pollution"* (**ENVIRONMENTAL**).

Given that the question asks about the WTP for preventing environmental damages, we may consider the answers as reflecting the individuals' marginal WTP. Answers may assume 4 values (disagree strongly, disagree, agree, strongly agree)[7]. Fig. 2 reports the frequencies registered for each answer in the whole sample, while fig.3 reports them by country.

According to the existing literature, the individual explanatory variables may be grouped in three broad categories:

- *individual socio-demographic characteristics:* age (**AGE**), age squared (**AGE2**, introduced in order to account for non linear effect), gender (**FEMALE**), parenthood status (**CHILDREN**), education (**EDUCATION**);

- *individual economic condition*: natural log of household income (**INCOME**) and its squared value (**INCOME2**), introduced to take into account non linear effect;

[6] http://www.europeanvaluesstudy.eu/

[7] Kollman et al. (2012) employed the same variable as a proxy for voters' acceptance of environmental taxes. Only this paper uses a European dataset, studying the profile of people more willing to pay for the environment. Pirani and Secondi (2010) also employs a European dataset, measuring the eco-friendly attitude, but variables on willingness to pay have not been taken into account.

- *personal beliefs and values*: political orientation (**RIGHT**), trust in government (**GOVER_TRUST**), trust in the others (**GEN_TRUST**), religious belonging (**RELIGION**), fear about environmental catastrophe (**ENV_CAT**), sense of belonging to the world as a whole (**WORLD_WHOLE**).

Tab.2 reports codes, detailed description, presentation of the modalities and sources of all these variables.

In order to explore the impact of context on individual preferences, we integrated the EVS micro data with some country level variables collected from other sources or elaborated by ourselves. A part from countries' dummies (**COUNTRY**), useful to account for unobserved cross country heterogeneity, we include three context variables:

- Environmental Performance Index (**EPI**) recorded for each country. The index, developed by the Yale University, measures country's environmental performances on a scale that ranges between 0 and 100.
- dummy taking the value of 1 for post USSR countries (**EST**);
- dummy taking the value of 1 for countries where an Environmental Fiscal Reform has been carried out (**REFORM**);

These variables are presented and fully described in tab. 2, while descriptive statistic for all the employed variables are reported in tab. 3. After list wise deletion of incomplete cases, our sample includes 21,264 observations.

As a preliminary analysis, we carried out an Analysis of Homogeneity of Variance (ANOVA) in order to understand if **REFORM** affects the distribution of the answers related to **ENVIRONMENTAL**. As it is well known, the one-way ANOVA compares the means of a dependent variable between groups and determines whether those means are significantly different from each other.
The significance of the Levene statistics, whose results are reported in tab. 4, gives evidence that the basic ANOVA assumption of homogeneity of variance between the groups (**REFORM**=0 and **REFORM**=1) has been violated; the Brown-Forsythe test and the Welch test (tab. 5) display an alternative version of the F statistic (weighting the groups' variances by the inverse of their sample size) and support the applicability of the ANOVA. The ANOVA results (tab. 6) highlight the existence of significant differences in the mean values of **ENVIRONMENTAL** comparing the two groups of countries.

5. Methodology

Given the discrete and ordered nature of our dependent variable, regression analyses were carried out using a categorical dependent variable model. We assume that WTP for preventing environmental pollution of individual *i* is characterized by a continuous latent variable:

$$Y_i^* = X_i\beta + \varepsilon_i \qquad [1]$$

where X_i is a vector of individual characteristics, ε_i is a random error term and β is the parameter to be estimated. While Y_i^* cannot be observed, we observe a variable Y_i that takes the values from 1 to 4, increasing in individual WTP for environmental interventions. More in detail, we have:

$$Y_i = j \text{ if } \kappa_{j-1} < Y_i^* < \kappa_j \text{ for } j = 1, \dots, 4 \qquad [2]$$

where κ_j indicates unknown cut-points to be estimated. The full set of probabilities of the possible outcomes is the following :

$$Pr[yi = j|x] = F(\kappa_j - X_i\beta) - F(\kappa_{j-1} - X_i\beta) \qquad [3]$$

assuming that $\kappa_0 = -\infty$ and $\kappa_j = +\infty$ and where F is the cumulative distribution function for the error term. This kind of model may be estimated through maximum likelihood. When the cumulative distribution function is supposed to be a standard Normal, the ordered probit model applies while the Ordered Logit model assumes that the cumulative distribution function is logistic. In this study, we apply the ordered logit estimates that allow computing odds ratios and making the interpretation of results clearer. The model applies to data meeting the parallel lines assumption (proportional odds, Long and Freese, 2006) that the effect of the independent variables do not vary by the level of the dependent variable.

6. Results

Tab. 7 shows the odds ratios and the standard errors we obtained in three different specifications (*M1*, *M2* and *M3*). All the estimates were also carried out by means of a standard OLS, in order to check for multicollinearity [8] by the variance of inflactor factor (VIF) test. Problems of multicollinearity were not detected: a part from squared variables (**AGE2** and **INCOME2**), that were included in the specifications in order to account for non linear effects of **AGE** and **INCOME**, no other variable registered a VIF value higher than 5.

In the first model (*M1*) only the individual variables have been included as explanatory . We find that females have lower WTP than men (see the results for the **FEMALE** dummy). Based on our

[8] Results are omitted but available upon request.

results, the individual WTP for the environment is significantly affected by the level of **EDUCATION,** as odds ratios for the **Middle** and **Upper education** show significant and >1 odds ratios.

Lots of the variables capturing personal beliefs and values turn out to be significant. **RIGHT** (WTP decreases when people are more right wing oriented but, interestingly, no significant differences are found between the extreme left and extreme right orientation), **GOVER_TRUST** (WTP is higher when people show trust in the government), **GEN_TRUST** (people who trust in the others exhibit an higher WTP), **WORLD_WHOLE** (the odds of having an high WTP for the environment are 63% higher for people who perceive themselves as belonging to the world as a whole), **ENV_CAT** (being convinced that an environmental catastrophe is going to happen, leads to significant higher WTP for environmental preservation).

INCOME is found to play a positive and significant role while the non significant odds ratio found for **INCOME2** does not support the hypothesis of non linear relationship between income and WTP for environmental preservation.

RELIGION also turns out to be determinant: **catholic**, **protestant**, **orthodox** and the residual **other** category all show higher WTP than non religious people. The positive effect seems to be very relevant for the **orthodox** category.

In the second model (*M2*) countries dummies have been included. The aim is to account for unobserved cross country heterogeneity. The inclusion of countries' dummies does not affect significantly the results we obtained in *M1*. The only relevant change in the results concerns the **orthodox** category which is not longer significant. Countries dummies show that WTP for the environment is significantly higher in **Greece** (odds ratio=5.52 , **Cyprus** (4.84), **Bulgaria** (4.37) and **Slovenia** (3.00) and lower in **Germany, Portugal** and **Finland** (the reference category here is **France**).

In the third model (*M3*) country dummies are replaced with the set of variables controlling for some national characteristics (**EPI**, **EST**, **REFORM**). As individuals within each country are, in fact, more similar to one another than individuals from another state, in *M3* the assumption that observations are independent and identically distributed is violated. For this reason, in order to obtain more reliable estimates clustered standard errors have been applied.

While we do not find any significant effect for **EPI, REFORM** shows a negative **and** significant impact. The odds of showing a high WTP for environmental preservation are 40% lower for respondents who live in a country were an EFR has been set out. A negative but low significant effect is also found for the **EST** dummy. However looking back at the *M2,* post URSS countries show significant and positive effect. Noticeable is the case of Estonia and Czech Republic in witch the EFR has been recently applied.

Results obtained for other variables do not significantly differ from the ones we found in *M1* except for the dummy **catholic** dummy, for the **Middle** education dummy**,** and for **INCOME**, which are not significant anymore.

Two kinds of robustness checks were carried out.
Firstly, we dichotomized our dependent variable and run again the analyses by the mean of a standard logit model, using the same specifications as before. Results are shown in tab. 8 (*M4*, *M5*, *M6*) and are very similar to the ones we obtained in with the ordered logit model and our original dependent variable.
Secondly, we replicated model 3 (*M3*) of tab. 7 by the means of the partial generalized ordered logit model. The generalized ordered logit model (Williams, 2006) may be applied to allow the coefficients to vary across categories of the dependent variable when the parallel lines assumption of the ordered logit is violated. Looking at the equations [1] and [2], this means that the coefficient β is allowed to differ for each of the categories j of the dependent variable.

In the partial generalized ordered logit model the parallel lines constraint is relaxed only for those variables where it is violated; variables whose effects do not significantly differ across equations have proportionality constraints imposed, so their coefficient do not vary across categories of the dependent variable. The analysis was run using the autofit option of the gologit2 module provided by Williams (2006).

Results of the partial generalized ordered logit model are shown in tab. 9. Basically, they confirm? the ones we obtained in previous models but, at the same time, they help in deepening the analysis of the impact of each explanatory variable.

Looking at tab. 9, the effect of **FEMALE** varies in both sign and magnitude across the range of WTP attitudes. We find that women tend not to take extreme positions: compared with men, they are more likely to show an higher WTP than **ENVIRONMENTAL** = 1 but, at the same time, a lower WTP than **ENVIRONMENTAL**=3. The effect of the political orientation (**RIGHT**) also varies in magnitude across the categories of the dependent variable: right- wing orientation has a negative impact especially, but not exclusively, on **ENVIRONMENTAL**=3.

The impact of **GOVER_TRUST** and **Upper EDUCATION** decreases across the categories of **ENVIRONMENTAL** while the impact of **WORLD_WHOLE** increases.

REFORM and **EST** both meet the parallel lines assumption: their impact does not vary across the categories of the dependent variable.

7. The role of knowledge in countries where the environmental fiscal reform (EFR) has been set out

Results presented in the previous sections show that willingness to pay for the environment is lower in countries where an environmental fiscal reform has been carried out. According to these results, knowledge about the existence of an EFR is presumably crucial: in countries where the EFR has been carried out, we expect people being informed about its existence to have a lower willing to give part of their income for preventing environmental pollution.

We test this hypothesis by considering the effect of knowledge on **ENVIRONMENTAL** in the countries where the EFR has been carried out and in the ones where it has not. One variable in our dataset may be considered as a proxy for knowledge: **EDUCATION** (more educated people are supposed to be more informed).

In tab. 10 we report the results of regression analyses run on two subsamples: one including all the interviews carried out in countries where the EFR has been implemented (**REFORM**=yes) and a second one including all the others (**REFORM**=no). We use the same specification applied for model 3 (*M3*) in tab. 7 but the variable **EST** is dropped because no ex communist countries carried out an EFR.

Looking at the results in tab.10, we find that **EDUCATION** has a positive effect on **ENVIRONMENTAL** in countries where an EFR has not been set out: the more people are educated, the higher is their WTP for environmental preservation. The odds of having a high WTP for environmental preservation are 17% higher for **Middle** educated people and 75% higher for people having **Upper EDUCATION**.

On the contrary, in countries where an EFR has been set out, **Middle** educated people register lower WTP (odds ratio=0.74) while the odds of having a high WTP are only 21% higher for **Upper** educated people.

These results suggest that, in countries where an EFR has been set out, knowledge about the existence of the EFR does seem to have a positive impact on individuals' WTP for environmental preservation.

8. Discussion

The main finding about the relation between the EFR and the WTP for the environment is that the latter is lower in countries where these reforms have been carried out. Moreover, further investigation on the role of information, which is crucial in understanding the effects of the reform (Kollmann et al., 2012; EEA 2011a, Bassi *et al.*, 2009), leads us at stating that people that are supposed to be aware about the EFR, considered the proxies used in this study as a measure of their knowledge, show a lower WTP. On this argument, Dresner et al. (2006) explains that reactions on the effects of EFR and double dividend can be skeptical, "independent of whether the interview partner already knew about the double dividend or had just been introduced to the argument" (Ibidem, 2006, p.901).

The result on the variable "income" can be discussed referring to several empirical studies that do not provide a unique explanation. As Torgler and Garcia-Valiñas (2007) state, usually, a positive relationship between income and environmental preference to contribute has been found, while as in Israel and Levinson (2004) there are predicts that MWTP will increase and then decrease with per-capita GDP, with a peak at the point where countries' environments begin improving and other that have no prediction about how MWTP will change as per-capita GDP increases (Ibidem 2004 p.15). We find support for the hypothesis of gender gap in environmental attitude, but differently from other studies (see above, par. 2), we do not find that women are more willing to pay for the environment, while as generally demonstrated, a high level of education affect

positively the WTP. The negative value of the REFORM variable cannot be explicitly explained by the analysis, but looking at the evidence of the facts and at similar studies, we can put our attention on three main elements: 1) the time; 2) the perception of the achieved level of environmental quality; 3) the weak aspects of the environmental fiscal reform. First it should take into consideration the circumstance for which respondents from EFR countries have been contributing to the protection of the environment by paying environmental taxes for about 20 years, at least ten years earlier than some other European countries. The environmental taxation, in fact, has a long tradition in Europe, but only recently, and specifically after the Directive 2003 on energy product and after the setting of stricter environmental quality targets, by the European climate and energy package (20-20-20)[9], the use of marked based instrument for protect and prevent the environment from further damages has became an imperative. This circumstance may lead at assuming that people living in EFR countries can be less willing to pay extra money for intervention related to the environment. This thought can be supported by the second mentioned circumstance for which their marginal utility in achieving additional improving of environmental quality may decrease as they perceive that an acceptable level of environmental quality has been already achieved, so they are not willing to pay extra money. Studies on the differences in WTP in developing and developed countries (Dorsh 2011), for instance, show that respondents from higher income countries are no more likely to be willing to pay for further environmental preservation. Finally as a number of academic papers state, the EFR system presents some weakness, in particular related to the social point of view, in terms of equity and acceptance. Moreover, one of the problem related to the EFR is the perception of the shift and the mistrust that the revenues can be actually used for improving the quality of the environment (Bassi et al. 2009). Thus, alternative recycling methods have been investigated.

9. Conclusion

The aim of the paper was to investigate the determinants of willingness to pay for the environment in Europe, focusing in particular on the role of Environmental Fiscal Reform. The Environmental Fiscal reform represent a complex system of measures aimed at reducing environmental externalities by market based instruments. Its general aim is to obtain jointly positive effects on employment, innovation and economic growth. Positive results have been actually showed by the 6 European countries in which the system has been implemented since the early nineties, but social impediments in terms of acceptance for the regressive effect have been also largely underlined by empirical researches. These important highlights let us suppose that EFR might affect the individual' preferences in terms of willingness to pay for the environment. In order to test it we employed an ordered probit model and analyzed micro data provided by the 2008-2010 wave of the European Values Survey (EVS).

As a measure of marginal WTP for the environment we used the following statement: "I would give part of my income if I were certain that the money would be used to prevent environmental

[9] European Commission, COM (2010) 2020, 'Europe 2020: A strategy for smart, sustainable and inclusive growth'.

pollution". In order to understand which factors might affect the WTP several explicative variables have been included in the model. In particular they encompassed: individual socio-demographic characteristics; individual economic condition and personal beliefs and values. Moreover to explore the impact of context on individual preferences, we integrated the EVS micro data with some country level variables, including Environmental Performance Index, the belonging to post USSR countries and the implementation of the environmental fiscal reform.

Focusing the attention on EFR, results show a negative effect of EFR on individuals' WTP for the environment, while further analysis on the role of information on WTP, show that a negative role of individual level of information is found in countries where the EFR has been set out.

Conscious of the limit of these kind of analysis based on value of judgments that might not reflect the real intention of the respondents, as the broad literature has shown, they can be considered a likely approximation of the reality and in this specific case, they might have important implication in supporting decision making process concerning the implementation of market based instruments for internalizing environmental externalities.

References

Andersen M.S. and Ekins P., (2009), Carbon-energy taxation: lessons from Europe, Oxford University Press, Oxford

Andersen M.K., Speck S., Mautone O., (2011) , Environmental fiscal reform- illustrative potential in Italy, Prepared for the conference "Environmentally-related taxation and fiscal reform" Rome, December 15th2011

Ashiabor H., Deketelaere K., Kreiser L., Miline J., (2005), Critical issues in environmental taxation, International and comparative perspectives: volume II, Richmond Law & Tax Ltd., Richmond, UK.

Auci S., Becchetti L., Rando L., (2006), Crucial model assumptions: the income/willingness to pay for the environment nexus in the Environmental Kutznetz Curve , http://dspace.uniroma2.it/dspace/bitstream/2108/286/1/239.pdf

Bach S., Kohlhaa M., Meyer B. , Praetorius B., Welsch H. , (2002), The Effects of Environmental Fiscal Reform in Germany: A Simulation Study, Energy Policy, Volume 30, Issue 9, 803–811

Baranzini A., Goldemberg J., Speck S., (2000), A future for carbon taxes, Ecological Economics, Volume 32, Issue 3, 395–412

Barker T. and Kohler J. (1998), Equity and Ecotax Reform in the EU: Achieving a 10 per cent Reduction in CO2 Emissions Using Excise Duties, Fiscal Studies, Volume 19, Issue 4, 375–402.

Barket T., Junankar S., Pollitt H., Summerton P., (2007), Carbon leakage from unilateral Environmental Tax Reforms in Europe, 1995–2005, Energy Policy, Volume 35, Issue 12, December 2007, 6281–6292

Barker T., Ekins P., Junankar S., Pollitt H., Summerton P., (2009), The competitiveness effects of European environmental fiscal reforms, European Review of Energy Markets- volume 3, issue 1.

Speck S., Summerton P., Lee D., Wiebe K., (2011), Environmental Taxes and ETRs in Europe: The Current Situation and a Review of the Modelling Literature, in Ekins P. and Speck S. (2011), Environmental Tax Reform (ETR), Oxford University Press.

Bassi S., Ten Brink, P., Pallemaerts M. (IEEP) and von Homeyer I. (Ecologic), (2009), Feasibility of implementing a radical ETR and its acceptance'. Report under task C of the 'Study on Tax Reform in Europe over the Next Decades: Implication for the Environment, for Eco-Innovation and for Household Distribution'

Bosello F., Carraro C., Galeotti M., (2001), The double dividend issue: modeling strategies and empirical findings, Environment and Development Economics, 6 : 9-45 2001 Cambridge University Press

Bosquet B., (2000), Environmental tax reform: does it work? A survey of the empirical evidence, Ecological Economics 34 (2000) 19–32

Carraro C., Galeotti M., Gallo M., (1996), Environmental taxation and unemployment: Some evidence on the 'double dividend hypothesis' in Europe, Journal of Public Economics, Volume 62, Issues 1–2, October 1996, Pages 141–181

Ceriani V., Franco D. (2011), Audizione nell'ambito dell'indagine conoscitiva sulla riforma fiscale e assistenziale (AC 4566), Banca D'Italia, Roma 13 Ottobre 2011

Clinch J.P., Dunne L., (2006a), Environmental tax reform: an assessment of social responses in Ireland, Energy Policy 34, 950–959

Clinch J.P., Dunne L., Dresner S., (2006b), Environmental and wider implications of political impediments to environmental tax reform, Energy Policy 34 , 960–970

Dorsh M. (2011), The Willingness to Pay for Environmental Preservation: Are Developing Economies Different? Proceedings of the German Development Economics Conference, Berlin 2011, No. 24, http://hdl.handle.net/10419/48337

Dresner S., Dunne L. , Clinch J.P, Beuermann C., (2006), Social and political responses to ecological taxreform in Europe: an introduction to the special issue, Energy Policy Volume 34, Issue 8, 895–904

Duroy Q. M. (2005), The Determinants of Environmental Awareness and Behavior, Rensselaer Polytechnic Institute, Working Papers in Economics

EEA,(2011a) Environmental tax reform in Europe: implications for income distribution, EEA Techni cal report No. 16/2011, Copenhagen.

EEA(2011b),Environmental tax reform in Europe: opportunities for eco-innovation, EEA Techn ical report No. 17/2011, Copenhagen.

Eurostat (2012), Taxation trends in the European Union, Eurostat statistical books, Luxembourg: Publications Office of the European Union, 2012

Eurostat (2010) Environmental statistics and accounts in Europe, Eurostat statistical books , Luxembourg: Publications Ofce of the European Union, 2010

EVS (2011): European Values Study 2008: Integrated Dataset (EVS 2008). GESIS Datenarchiv, Köln. ZA4800 Datenfile Version 3.0.0, doi:10.4232/1.11004

Franzen A. and Meyer R. (2010), —Environmental Attitudes in Cross-National Perspective: A Multilevel Analysis of the ISSP 1993 and 2000, European Sociological Review (2010) 26(2): 219-234.

Greeley A., (1993), Religion and Attitudes toward the Environment, Journal for the Scientific Study of Religion, Vol. 32, No. 1 (Mar., 1993), pp. 19-28

Inglehart R. (1995) Public Support for Environmental Protection: Objective Problems and Subjective Values, Political Science and Politics, Vol. 28, No. 1 (Mar., 1995), pp. 57-72

Israel D. and Levinson, A. (2004) Willingness to pay for environmental quality: Testable empirical implications of the growth and environmental literature, Contributions to Economic Analysis and Policy, 3, 1–29.

Klok J., Larsen A., Hansen K. (2006), Ecological Tax Reform in Denmark: history and social acceptability, Energy Policy, 34 905–916

Kollmann A., Reichl J., Schneider F. (2012) Who is willing to pay for the environment? An empirical analysis of Europeans willingness to contribute monetarily to environmental preservation, Draft Paper, submitted to be presented at the 2nd World Congress of the Public Choice societies, 8-11 March 2012

Konisky, D.M., J. Milyo and L. E. Richardson (2008), ―Environmental Policy Attitudes: Issues, Geographical Scale, and Political Trust‖, Social Science Quarterly 89 (5): 1066-1085.

Leicester A., (2006), The UK tax system and the Environment, The Institute for Fiscal Studies, London, UK.

Long J.S. and Freese J. (2006), Regression Models for Categorical Dependent Variables Using Stata, Second Edition, Stata Press

O' Riordan T., (1997), Ecotaxation, Earhscan publications, London UK.

Pezzey J.C.V. and Park A. (1998), Reflections on the Double Dividend Debate, Environmental and resource economics, Volume 11, Numbers 3-4, 539-555

Pirani E. and Secondi L. (2010), Eco-Friendly Attitudes: What European Citizens Say and What They Do, *International Journal* of *Environmental Research* and Public Health, 5(1):67-84

Speck S. (1999), Energy and carbon taxes and their distributional implications, Energy Policy, Volume 27, Issue 11, 659–667

Torgler, B. and Garcia-Valiñas, M. (2006) Participation in Environmental Organizations: An Empirical Analysis, Berkeley Program in Law and Economics, Working Paper Series, http://escholarship.org/uc/item/6h51g5xv

Torgler, B. and Garcia-Valiñas, M. (2007) The determinants of individuals' attitudes towards preventing environmental damage, Ecological Economics, 63, 536–552.

Torgler, B. and Garcia-Valiñas, M., Macintyre A. (2008), Alison Differences in Preferences Towards the Environment: The Impact of a Gender, Age and Parental Effect, The Fondazione Eni Enrico Mattei Note di Lavoro Series

Williams R. (2006), Generalized ordered logit/partial proportional odds models for ordinal dependent variables, http://www.stata-journal.com/software/sj6-1/st0097/

Witzke H. P. , Urfei G. (2001), Willingness To Pay for Environmental Preservation in Germany: Coping With the Regional Dimension , Regional Studies Volume 35, Issue 3, 2001

Tables and figures

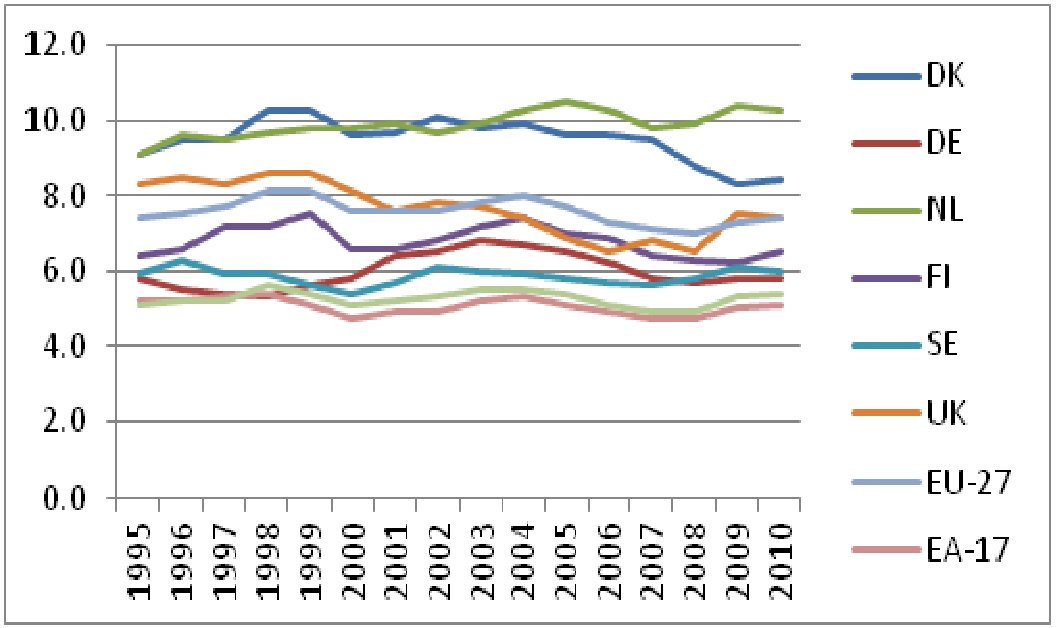

Fig. 1: Environmental taxes as % of total taxation. Source: Eurostat(2012)

Country	TAX	YEAR	EFR[10]
Denmark	Co2 tax	1992	Tax revenue from income, labour to pollution and scarce environmental resources.
	Energy package (increase of Co2 tax + So2 tax and energy tax on natural gas + on energy used for space heating – households-)	1996	Revenues used to reduce employers' social security contributions and investment aids for energy saving.
	Tax shifting programmes	1994-2002	A three phases programme involving households and industries. Reduction of SSC.
Finland	Co2 tax	1990	Reduction of income tax and social insurance contributions
	Landfill tax	1996	
	ETR s	1997	Reduction of labour taxes and increase of environmental taxes
	ETR s	1998	
Germany	Mineral oil taxes on transport fuels	1999-2003	Reduction of tax wedge on labour through reduced social security contributions for both employers and employees.
	Taxes on heavy fuels	2000-2003	
	Electricity tax	1999	
	Heating fuel tax on natural gas and on heavy fuel oil	2004	
The Netherlands	Energy regulating tax	1996	Revenue returned to households in terms of reduced social security contributions
Sweden	Energy/excise taxed levied on energy products	1991	Reduction in income tax
	Co2 taxes	1991	
	So2 taxes	1991	
	Nox charge	1992	Revenues refunded to power plants covered by the charge, in proportion to the amount of energy they generate.
	Green tax shift	2001 -2006	Reduction of income taxes and increase of environmental related taxes
	Fiscal policy programme	2007- 2009	Revision of rates and sectors
UK	Transport fuel taxes	1990	Reduction of employers national insurance contributions
	Landfill tax	1996	
	Climate change Levy	2001	
	Mineral Aggregated taxes	2002	

Tab. 1: Environmental Fiscal Reform (EFR) in Denmark, Finland, Germany, Netherlands, Sweden, UK.

[10] Contents of this table have been mainly drawn by: Ashiabor et al. (2005), Andersen and Ekins (2009), Bosquet (2000), Ekins and Speack (2011).

Code	Question/description	Modalities	Source
ENVIRONMENTAL	I would give part of my income if I were certain that the money would be used to prevent environmental pollution	disagree strongly	EVS 2008
		disagree	EVS 2008
		agree	EVS 2008
		strongly agree	EVS 2008
FEMALE	Are you male or female?	0=male	EVS 2008
		1=female	EVS 2008
AGE	How old are you?	*continuous*	EVS 2008
AGE2	Age squared	*continuous*	EVS 2008
CHILDREN *	Have you had any children?	0=no	EVS 2008
		1=yes	EVS 2008
EDUCATION	What is the highest educational level that you have attained?	Lower	EVS 2008
		Middle	EVS 2008
		Upper	EVS 2008
RIGHT	In political matters, people talk of "the left" and "the right." How would you place your views on this scale, generally speaking?	left (***reference)***	EVS 2008
		2	EVS 2008
		3	EVS 2008
		4	EVS 2008
		5	EVS 2008
		6	EVS 2008
		7	EVS 2008
		8	EVS 2008
		9	EVS 2008
		right	EVS 2008
GOVER_TRUST *	Could you tell me how much confidence you have in the government of your country?	0= not very much / none at all	EVS 2008
		1= quite a lot/a great deal	EVS 2008
GEN_TRUST *	Most people can be trusted or that you need to be very careful in dealing with people?	0=cannot be too careful	EVS 2008
		1= most people can be trusted	EVS 2008
ENV_CAT *	Environment: if things continue we will experience a catastrophe	0= disagree or strongly disagree	EVS 2008
		1= strongly agree or agree	EVS 2008
RELIGION *	Do you belong to a religion or religious denomination? If yes, which one?	roman catholic	EVS 2008
		protestant	EVS 2008
		ortodhox	EVS 2008
		other (free church, buddhist, hindu, jew, etc.)	EVS 2008
		not religious ***(reference)***	EVS 2008
WORLD_WHOLE	Which of these geographical groups would you say you belong to first of all? The world as a whole	0=no	EVS 2008
		1= yes	EVS 2008
INCOME	Natural log of monthly household income (x1000), corrected for PPP in Euros	*continuous*	EVS 2008
INCOME2	INCOME squared	*continuous*	EVS 2008
EST	Dummy for post USSR countries	*continuous*	Own elaboration
EPI	Environmental Performance Index (Historical EPI)	*continuous*	Yale Center for Environmental Law and Policy (YCELP)
REFORM	Dummy =1 for countries were EFR was carried out	*0=no; 1=yes*	own elaboration
COUNTRY	Countries' dummies	One dummy for each country: Austria, Belgium, Bulgaria, Cyprus, Czech Republic, Denmark, Estonia, Finland, France ***(reference)***, Germany, Greece, Hungary, Ireland, Italy, Latvia, Lithuania, Luxemburg, Malta, Netherlands, Poland, Portugal, Romania, Slovak Republic, Slovenia, Spain, Sweden, United Kingdom (UK)	EVS 2008

Tab. 2: codes, detailed description, presentation of the modalities and sources of all the variables. * indicates variables which have been recoded from the original EVS database. Reference categories in italic bold

Variable	Modalities	Obs	Mean	Std. Dev.	Min	Max	Variable	Modalities	Obs	Mean	Std. Dev.	Min	Max
FEMALE		21264	0.52	0.50	0	1	COUNTRY	Austria	21264	0.04	0.20	0	1
AGE		21264	48.94	17.25	16	108		Belgium	21264	0.06	0.23	0	1
AGE2		21264	2692.45	1754.62	256	11664		Bulgaria	21264	0.03	0.18	0	1
CHILDREN		21264	0.73	0.44	0	1		Cyprus	21264	0.02	0.15	0	1
EDUCATION	Lower							Czech					
		21264	0.29	0.45	0	1		Republic	21264	0.04	0.20	0	1
	Middle	21264	0.46	0.50	0	1		Denmark	21264	0.04	0.21	0	1
	Upper	21264	0.26	0.44	0	1		Estonia	21264	0.04	0.20	0	1
RIGHT	left	21264	0.05	0.22	0	1		Finland	21264	0.03	0.18	0	1
	2	21264	0.04	0.20	0	1		France	21264	0.06	0.23	0	1
	3	21264	0.10	0.30	0	1		Germany	21264	0.06	0.24	0	1
	4	21264	0.10	0.30	0	1		Greece	21264	0.05	0.21	0	1
	5	21264	0.31	0.46	0	1		Hungary	21264	0.05	0.23	0	1
	6	21264	0.13	0.34	0	1		Ireland	21264	0.01	0.12	0	1
	7	21264	0.10	0.30	0	1		Italy	21264	0.03	0.17	0	1
	8	21264	0.09	0.29	0	1		Latvia	21264	0.04	0.19	0	1
	9	21264	0.03	0.17	0	1		Lithuania	21264	0.02	0.15	0	1
	right	21264	0.05	0.21	0	1		Luxemburg	21264	0.04	0.20	0	1
GOVER_TRUST		21264	0.35	0.48	0	1		Malta	21264	0.02	0.14	0	1
GEN_TRUST		21264	1.36	0.48	1	2		Netherlands	21264	0.05	0.22	0	1
ENV_CAT		21264	0.81	0.39	0	1		Poland	21264	0.03	0.18	0	1
RELIGION	roman catholic	21264	0.37	0.48	0	1		Portugal	21264	0.02	0.14	0	1
	protestant	21264	0.15	0.36	0	1		Romania	21264	0.02	0.16	0	1
	ortodhox							Slovak					
		21264	0.13	0.34	0	1		Republic	21264	0.03	0.18	0	1
	not religious	21264	0.31	0.46	0	1		Slovenia	21264	0.03	0.17	0	1
	other	21264	0.04	0.19	0	1		Spain	21264	0.03	0.18	0	1
WORLD_WHOLE		21264	0.05	0.22	0	1		Sweden	21264	0.03	0.17	0	1
INCOME		21264	0.16	0.86	-2.99	2.69		UK	21264	0.04	0.20	0	1
INCOME2		21264	0.76	1.11	0.00	8.94							
EST		21264	0.32	0.47	0	1							
EPI		21264	63.19	5.70	47.7	70.2							
REFORM		21264	0.26	0.44	0	1							

Tab. 3: Descriptive statistics

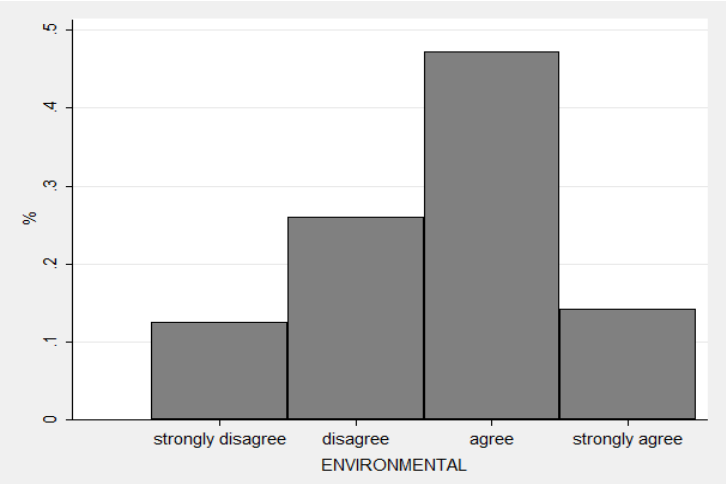

Fig. 2: Willingness to pay for environmental preservation (ENVIRONMENTAL). Whole sample. Source: Own elaboration on EVS data after listwise deletion of incomplete cases.

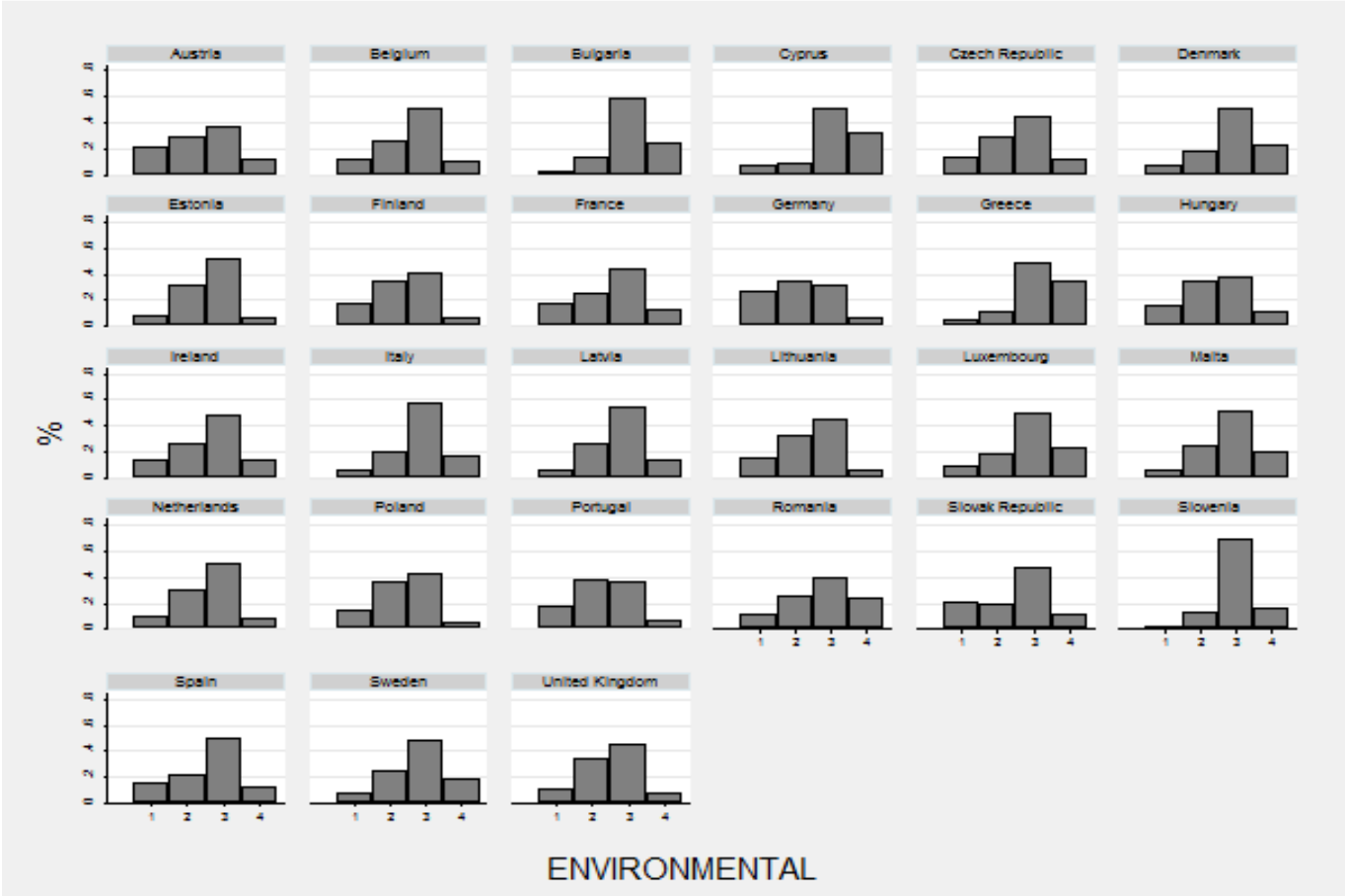

Fig. 3: Willingness to pay for environmental preservation (ENVIRONMENTAL) by country. Source: Own elaboration on EVS data after listwise deletion of incomplete cases.

Levene Statistic	df1	df2	Sig.
14.323	1	21262	.000

Tab. 4: Test of homogeneity of variances. The dependent variable is ENVIRONMENTAL while the factor is REFORM.

	Statistic	df1	df2	Sig.
Welch	109.674	1	9690.082	.000
Brown-Forsythe	109.674	1	9690.082	.000

Tab. 5: Robust test of equality of means. The dependent variable is ENVIRONMENTAL while the factor is REFORM.

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	83.652	1	83.652	109.595	.000
Within Groups	16228.894	21262	.763		
Total	16312.546	21263			

Tab. 6: ANOVA statistics. The dependent variable is ENVIRONMENTAL while the factor is REFORM.

		M1		M2		M3[a]	
FEMALE		0.94**	(0.02)	0.94**	(0.02)	0.93*	(0.03)
AGE		1.00	(0.00)	1.00	(0.00)	1.00	(0.01)
AGE2		1.00	(0.00)	1.00	(0.00)	1.00	(0.00)
CHILDREN		1.01	(0.04)	0.99	(0.04)	1.02	(0.05)
EDUCATION	Middle	1.07**	(0.03)	1.21***	(0.04)	1.11	(0.08)
	Upper	1.50***	(0.06)	1.72***	(0.07)	1.57***	(0.12)
RIGHT	2	0.97	(0.08)	1.09	(0.10)	1.01	(0.11)
	3	0.88*	(0.06)	0.99	(0.07)	0.92	(0.09)
	4	0.78***	(0.06)	0.89	(0.07)	0.83	(0.10)
	5	0.75***	(0.05)	0.83***	(0.05)	0.78***	(0.07)
	6	0.74***	(0.05)	0.84**	(0.06)	0.79*	(0.10)
	7	0.76***	(0.06)	0.84**	(0.06)	0.82*	(0.09)
	8	0.73***	(0.05)	0.80***	(0.06)	0.78**	(0.09)
	9	0.76***	(0.07)	0.83**	(0.08)	0.79	(0.13)
	right	0.97	(0.08)	1.01	(0.09)	1.01	(0.16)
GEN_TRUST		1.27***	(0.04)	1.29***	(0.04)	1.34***	(0.08)
RELIGION	roman						
	catholic	1.12***	(0.04)	1.09**	(0.04)	0.99	(0.07)
	protestant	1.13***	(0.05)	1.20***	(0.06)	1.38*	(0.25)
	ortodhox	2.78***	(0.12)	0.96	(0.07)	2.38***	(0.37)
	other	1.33***	(0.09)	1.21**	(0.09)	1.32**	(0.18)
ENV_CAT		1.99***	(0.07)	1.97***	(0.07)	1.90***	(0.14)
GOVER_TRUST		1.36***	(0.04)	1.25***	(0.04)	1.35***	(0.08)
WORLD_WHOLE		1.63***	(0.10)	1.65***	(0.10)	1.58***	(0.10)
INCOME		1.08***	(0.02)	1.06***	(0.02)	1.07	(0.05)
INCOME2		1.01	(0.01)	1.00	(0.01)	1.00	(0.03)
COUNTRY	Austria			0.88	(0.08)		
	Belgium			1.27***	(0.10)		
	Bulgaria			4.37***	(0.47)		
	Cyprus			4.84***	(0.62)		
	Czech Republic			1.37***	(0.12)		
	Denmark			2.20***	(0.21)		
	Estonia			1.34***	(0.11)		
	Finland			0.52***	(0.05)		
	Germany			0.49***	(0.04)		
	Greece			5.52***	(0.61)		
	Hungary			0.99	(0.08)		
	Ireland			1.32**	(0.16)		
	Italy			2.27***	(0.21)		
	Latvia			1.88***	(0.17)		
	Lithuania			0.87	(0.09)		
	Luxemburg			2.08***	(0.18)		
	Malta			2.36***	(0.26)		
	Netherlands			1.26***	(0.10)		
	Poland			0.92	(0.08)		
	Portugal			0.80**	(0.09)		
	Romania			2.68***	(0.34)		
	Slovak Republic			1.15	(0.11)		
	Slovenia			3.00***	(0.28)		
	Spain			1.30***	(0.12)		
	Sweden			1.35***	(0.13)		
	UK			1.08	(0.09)		
EPI						0.99	(0.01)
EST						0.79*	(0.11)
REFORM						0.60**	(0.15)
Obs.		21264		21264		21264	
log likelihood		-25604.71		-24969.23		-25511.65	
Pseudo R2		0.03		0.05		0.03	
LR chi2		1620.93		2891.89		.	
PR>chi2		0.00		0.00		.	
BIC		51488.44		50476.56		51282.38	

Tab. 7: Ordered logit estimates. The dependent variable is ENVIRONMENTAL. Odds ratios and standard errors (in parentheses). *,,*** mean significantly different from zero at the 0.10, 0.05, 0.01 significance level. a= clustered standard errors applied**

		M4		M5		M6[a]	
FEMALE		0.94**	(0.03)	0.94**	(0.03)	0.93**	(0.03)
AGE		0.99	(0.01)	1.00	(0.01)	1.00	(0.01)
AGE2		1.00	(0.00)	1.00	(0.00)	1.00	(0.00)
CHILDREN		1.01	(0.04)	0.98	(0.04)	1.01	(0.06)
EDUCATION	Middle	1.09**	(0.04)	1.23***	(0.05)	1.12	(0.08)
	Upper	1.63***	(0.07)	1.88***	(0.09)	1.70***	(0.14)
RIGHT	2	1.01	(0.10)	1.12	(0.12)	1.04	(0.10)
	3	0.92	(0.08)	1.04	(0.09)	0.97	(0.09)
	4	0.86*	(0.07)	0.99	(0.09)	0.92	(0.10)
	5	0.76***	(0.06)	0.83**	(0.06)	0.79***	(0.07)
	6	0.76***	(0.06)	0.87*	(0.07)	0.82	(0.10)
	7	0.82**	(0.07)	0.90	(0.08)	0.88	(0.10)
	8	0.78***	(0.07)	0.85*	(0.07)	0.82*	(0.09)
	9	0.76***	(0.08)	0.82*	(0.09)	0.79	(0.13)
	right	0.96	(0.09)	1.01	(0.10)	1.00	(0.14)
GEN_TRUST		1.28***	(0.04)	1.32***	(0.05)	1.36***	(0.09)
RELIGION	roman catholic	1.10***	(0.04)	1.06	(0.04)	0.96	(0.07)
	protestant	1.09*	(0.05)	1.23***	(0.07)	1.37	(0.26)
	ortodhox	2.62***	(0.14)	0.96	(0.09)	2.26***	(0.41)
	other	1.33***	(0.11)	1.20**	(0.10)	1.33**	(0.19)
ENV_CAT		2.10***	(0.08)	2.09***	(0.08)	2.01***	(0.16)
GOVER_TRUST		1.45***	(0.05)	1.33***	(0.04)	1.44***	(0.09)
WORLD_WHOLE		1.64***	(0.12)	1.65***	(0.12)	1.58***	(0.14)
INCOME		1.08***	(0.02)	1.06***	(0.02)	1.07	(0.05)
INCOME2		1.00	(0.01)	1.00	(0.01)	1.00	(0.03)
COUNTRY	Austria			0.88	(0.08)		
	Belgium			1.37***	(0.12)		
	Bulgaria			5.35***	(0.74)		
	Cyprus			4.77***	(0.80)		
	Czech Republic			1.35***	(0.13)		
	Denmark			1.98***	(0.22)		
	Estonia			1.37***	(0.13)		
	Finland			0.48***	(0.05)		
	Germany			0.48***	(0.04)		
	Greece			5.03***	(0.69)		
	Hungary			0.92	(0.08)		
	Ireland			1.29*	(0.17)		
	Italy			2.53***	(0.28)		
	Latvia			1.93***	(0.20)		
	Lithuania			0.88	(0.10)		
	Luxemburg			1.92***	(0.19)		
	Malta			2.23***	(0.29)		
	Netherlands			1.27***	(0.11)		
	Poland			0.92	(0.09)		
	Portugal			0.76**	(0.09)		
	Romania			2.10***	(0.30)		
	Slovak Republic			1.32***	(0.13)		
	Slovenia			5.11***	(0.68)		
	Spain			1.39***	(0.14)		
	Sweden			1.16	(0.13)		
	UK			1.02	(0.10)		
EPI						1.00	(0.01)
EST						0.80	(0.12)
REFORM						0.55**	(0.14)
Obs.		21264		21264		21264	
log likelihood		-13485.64		-13028.34		-13396.25	
Pseudo R2		0.05		0.08		0.05	
LR chi2		1379.71		2294.31		.	
PR>chi2		0.00		0.00		.	
BIC		27230.36		26525.02		27051.58	

Tab. 8: Ordered logit estimates. The dependent variable is ENVIRONMENTAL recoded into two categories. Odds ratios and standard errors (in parentheses). *,,*** mean significantly different from zero at the 0.10, 0.05, 0.01 significance level. a= clustered standard errors applied**

		ENVIRONMENTAL=1		ENVIRONMENTAL=2		ENVIRONMENTAL=3	
FEMALE		0.12***	(0.04)	-0.07*	(0.04)	-0.18***	(0.04)
AGE		0.00	(0.01)	0.00	(0.01)	0.00	(0.01)
AGE2		-0.00	(0.00)	-0.00	(0.00)	-0.00	(0.00)
CHILDREN		0.02	(0.05)	0.02	(0.05)	0.02	(0.05)
EDUCATION	Middle	0.11	(0.07)	0.11	(0.07)	0.11	(0.07)
	Upper	0.54***	(0.11)	0.52***	(0.08)	0.31***	(0.08)
RIGHT	2	0.01	(0.11)	0.01	(0.11)	0.01	(0.11)
	3	-0.07	(0.10)	-0.07	(0.10)	-0.07	(0.10)
	4	-0.10	(0.12)	-0.13	(0.12)	-0.33**	(0.13)
	5	-0.07	(0.10)	-0.27***	(0.09)	-0.27***	(0.09)
	6	0.04	(0.14)	-0.24*	(0.13)	-0.38***	(0.14)
	7	-0.00	(0.14)	-0.16	(0.12)	-0.37***	(0.09)
	8	-0.24**	(0.11)	-0.24**	(0.11)	-0.24**	(0.11)
	9	-0.21	(0.17)	-0.29*	(0.17)	-0.06	(0.18)
	right	-0.25	(0.17)	-0.06	(0.14)	0.21	(0.15)
GEN_TRUST		0.41***	(0.07)	0.29***	(0.06)	0.23***	(0.08)
RELIGION	roman						
	catholic	-0.01	(0.07)	-0.01	(0.07)	-0.01	(0.07)
	protestant	0.32*	(0.19)	0.32*	(0.19)	0.32*	(0.19)
	ortodhox	0.84***	(0.15)	0.84***	(0.15)	0.84***	(0.15)
	other	0.27**	(0.13)	0.27**	(0.13)	0.27**	(0.13)
ENV_CAT		0.65***	(0.07)	0.65***	(0.07)	0.65***	(0.07)
GOVER_TRUST		0.41***	(0.08)	0.36***	(0.06)	0.12*	(0.06)
WORLD_WHOLE		0.14**	(0.07)	0.46***	(0.09)	0.52***	(0.09)
INCOME		0.07	(0.05)	0.07	(0.05)	0.07	(0.05)
INCOME2		0.01	(0.03)	0.01	(0.03)	0.01	(0.03)
EPI		-0.01	(0.01)	-0.01	(0.01)	-0.01	(0.01)
EST		-0.23*	(0.14)	-0.23*	(0.14)	-0.23*	(0.14)
REFORM		-0.52**	(0.26)	-0.52**	(0.26)	-0.52**	(0.26)
Obs.				21264			
log likelihood				-25409.77			
Pseudo R2				0.04			
LR chi2				973.89			
PR>chi2				0.00			
BIC				51078.63			

Tab. 9: Generalized ordered logit (GOLOGIT) estimates with the parallel lines constraint relaxed only for those variables where it is violated (partial proportional odds model). The dependent variable is ENVIRONMENTAL. Coefficients and standard errors corrected for clustering at country level in parentheses. *,,*** mean significantly different from zero at the 0.10, 0.05, 0.01 significance level.**

		REFORM=YES		*REFORM=NO*	
FEMALE		0.94	(0.09)	0.93**	(0.03)
AGE		0.99	(0.02)	1.00	(0.01)
AGE2		1.00	(0.00)	1.00	(0.00)
CHILDREN		1.01	(0.07)	0.97	(0.07)
EDUCATION	Middle	0.74***	(0.08)	1.17**	(0.09)
	Upper	1.21**	(0.11)	1.75***	(0.20)
RIGHT	2	1.13	(0.20)	0.98	(0.09)
	3	0.97	(0.20)	0.94	(0.09)
	4	0.91	(0.19)	0.86	(0.11)
	5	0.76	(0.17)	0.76***	(0.07)
	6	0.67	(0.18)	0.81	(0.11)
	7	0.67	(0.17)	0.90	(0.11)
	8	0.55**	(0.13)	0.89	(0.11)
	9	0.44**	(0.14)	0.88	(0.14)
	right	0.56*	(0.18)	1.06	(0.14)
GEN_TRUST		1.77***	(0.12)	1.19***	(0.08)
RELIGION	roman catholic	1.26	(0.21)	0.96	(0.09)
	protestant	1.38	(0.30)	1.34*	(0.21)
	ortodhox	0.38***	(0.12)	2.33***	(0.48)
	other	1.42**	(0.24)	1.36*	(0.25)
ENV_CAT		1.86***	(0.26)	2.19***	(0.19)
GOVER_TRUST		1.56***	(0.18)	1.45***	(0.11)
WORLD_WHOLE		1.66***	(0.22)	1.62***	(0.17)
INCOME		1.14	(0.10)	1.12	(0.08)
INCOME2		1.04	(0.04)	1.00	(0.03)
EPI		0.95	(0.09)	1.00	(0.01)
Obs.		5532		15732	
log likelihood		-3543.84		-9786.68	
Pseudo R2		0.07		0.05	
LR chi2		.		.	
PR>chi2		.		.	
BIC		7130.76		19766.64	

Tab. 10: Ordered logit estimates. The dependent variable is ENVIRONMENTAL. Odds ratios and standard errors adjusted for clustering at country level (in parentheses). *,,*** mean significantly different from zero at the 0.10, 0.05, 0.01 significance level.**